



This is a repository copy of *How the Availability of Observation Status Affects Emergency Physician Decisionmaking*.

White Rose Research Online URL for this paper:  
<http://eprints.whiterose.ac.uk/134700/>

Version: Accepted Version

---

**Article:**

Wright, B., Martin, G.P., Ahmed, A. et al. (3 more authors) (2018) How the Availability of Observation Status Affects Emergency Physician Decisionmaking. *Annals of Emergency Medicine*, 72 (4). pp. 401-409. ISSN 0196-0644

<https://doi.org/10.1016/j.annemergmed.2018.04.023>

---

**Reuse**

This article is distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs (CC BY-NC-ND) licence. This licence only allows you to download this work and share it with others as long as you credit the authors, but you can't change the article in any way or use it commercially. More information and the full terms of the licence here: <https://creativecommons.org/licenses/>

**Takedown**

If you consider content in White Rose Research Online to be in breach of UK law, please notify us by emailing [eprints@whiterose.ac.uk](mailto:eprints@whiterose.ac.uk) including the URL of the record and the reason for the withdrawal request.



[eprints@whiterose.ac.uk](mailto:eprints@whiterose.ac.uk)  
<https://eprints.whiterose.ac.uk/>

## **How the Availability of Observation Status Affects Emergency Physician Decisionmaking**

Brad Wright, PhD

Department of Health Management and Policy, University of Iowa, Iowa City, IA, USA

Graham P. Martin, PhD

SAPPHIRE Group, Department of Health Sciences, University of Leicester, Leicester, UK

Azeemuddin Ahmed, MD, MBA

Department of Emergency Medicine, University of Iowa Carver College of Medicine, Iowa City, IA, USA

Jay Banerjee, MBBS, MEd

University Hospitals of Leicester NHS Trust, Emergency Department, Leicester, UK

Suzanne Mason, MBBS, MD

School of Health and Related Research, University of Sheffield, Sheffield, UK

Damian Roland, MBBS, PhD

University Hospitals of Leicester NHS Trust, Pediatric Emergency Medicine Academic Group, Leicester, UK

### Corresponding author and request for reprints:

Brad Wright, Department of Health Management and Policy, College of Public Health.

University of Iowa, 145 North Riverside Drive, Iowa City, IA 52242, USA.

Phone: 319-384-4369 Fax: 319-384-4371

Email: brad-wright@uiowa.edu

**Acknowledgements:** The authors thank Ms. Alena Tourtellotte for assistance in cleaning and coding interview transcripts. This study was supported by a University of Iowa College of Public Health Faculty Development Grant for Global Public Health Research. Dr Martin's contribution was kindly supported by the NIHR Collaboration for Leadership in Applied Health Research and Care East Midlands (CLAHRC EM). The views expressed in this publication are those of the authors and not necessarily those of the National Health Service, the NIHR, or the Department of Health.

**Conflict of Interest Disclosure:** BW, GPM, AA, JB, SM, and DR report no conflict of interest.

**Word Count:** 4,429

**Author Contributions:** BW, GPM, JB, and DR conceived the study and obtained research funding. AA, JB, SM, and DR recruited study participants. BW and GPM conducted the interviews and analyzed the data. BW drafted the manuscript, and all authors contributed substantially to its revision. BW takes responsibility for the paper as a whole.

## **Abstract**

**Objective:** This study sought to understand how emergency physicians decide to utilize observation services, and how placing a patient under observation influences physicians' subsequent decision-making.

**Methods:** We conducted in-depth semi-structured interviews with 24 emergency physicians, including 10 from a hospital in the American Midwest, and 14 from two hospitals in central and northern England. Data were extracted from the interview transcripts using open coding and analyzed using axial coding.

**Results:** We found that physicians used a mix of intuitive and analytic thinking in initial decisions to admit, observe, or discharge patients depending on the physician's individual level of risk aversion. Placing patients under observation made some physicians more systematic, while others cautioned against overreliance on observation services in the face of uncertainty.

**Conclusions:** Emergency physicians routinely make decisions in a highly resource-constrained environment. Observation services can relax these constraints by providing physicians with additional time, but absent clear protocols and metacognitive reflection on physician practice patterns, this may hinder—rather than facilitate—decision-making.

## **Introduction**

### **Background**

The last decade has seen a substantial increase in observation services—hospital-based ambulatory care used to evaluate and treat patients presenting at the ED, while a decision is made regarding admission or discharge.<sup>1</sup> While evidence from both England and the U.S. demonstrates that observation services can reduce unnecessary inpatient admissions, reduce inappropriate ED discharges, and improve diagnosis and treatment,<sup>2,3</sup> analyses of claims or medical records contribute little to our understanding of how emergency physicians think. Consequently, little is known about how physicians decide to place patients under observation, or how this influences physicians' subsequent decision-making. As the use of observation services continues to rise, answering these questions is important.<sup>1,4</sup>

Emergency physicians now have more information and options to consider in their decision-making. Crudely, the process has moved from binary (admit/discharge) to ternary (admit/observe/discharge), with observation affording the opportunity to gather additional information. If physicians' initial decision-making processes lead them to incorrect decisions, they risk discharging patients prematurely—with obvious deleterious implications for patient safety—or observing or admitting patients unnecessarily—with implications for efficient resource use, patient experience, and potential iatrogenic harm. Similarly, observation's usefulness largely depends on the degree to which it facilitates better decision-making—whether the extra time and opportunities for diagnostic testing it affords are used effectively for the patients who stand to benefit most.<sup>5</sup> While a few studies have examined emergency physician decision-making, we know of none examining decision-making in the context of observation services.<sup>6-11</sup>

## Goals of This Investigation

This study sought to understand how emergency physicians make decisions about observation services use. Because this decision may be influenced by health policies governing payment and care delivery—for example, the four-hour maximum wait in the ED in England,<sup>12</sup> and pressures to maximize hospital reimbursement peculiar to the U.S.<sup>13</sup>—we examine emergency physicians’ decision-making in two differently structured national health care systems (England and the U.S.). We have previously described why we selected these two countries and the general role observation services plays in both.<sup>14</sup> We hypothesize that emergency physicians rely more heavily on intuitive thinking when deciding to place patients under observation. Conversely, we hypothesize that the extra time afforded by placing patients under observation may permit physicians to increase reliance on analytic thinking.

## Methods

### Study Design and Setting

We conducted in-depth semi-structured interviews with a convenience sample of 24 emergency physicians, including 10 from a large academic medical center in the American Midwest, and 14 from two large academic medical centers in central and northern England. We initially planned to sample 10 physicians at each site, but achieved thematic saturation earlier than expected, as the interviewers jointly determined that no new themes had emerged during several subsequent interviews. We contacted physicians by email and/or telephone, informed them about the study, and invited their participation. To ensure representation of various perspectives, we sought a mix of physicians by gender and practice experience. To encourage participation, interviewees received a \$50 Amazon.com gift card.

## Data Collection

Physicians agreeing to participate received a follow-up email and/or telephone call to schedule an interview time. We conducted and digitally recorded all interviews in person. One interviewer was American and the other was English, and both conducted approximately half of the interviews in each country, to balance any cultural biases that might otherwise occur in a cross-national study. Interviewers used a guide containing fixed-response and open-ended questions developed from the observation literature in consultation with our emergency physician co-investigators (see Appendix). Questions specific to the decision-making process were guided conceptually by dual process theory. We allowed discussions to evolve naturally, not asking all questions in every instance, altering question order, and asking unscripted questions as appropriate to probe emerging topics of interest. Then, we had the audio files professionally transcribed.

## Analysis

Initially, a trained research assistant read all transcripts to gain familiarity with the data, note any emerging themes, and ensure that respondents' remarks were accurately captured. Then, she manually coded the interviews in Microsoft Word, beginning with codes derived from the interview guide, and creating additional codes as suggested by the data, ensuring that unanticipated themes were incorporated into the analysis. Two co-authors from different disciplinary backgrounds conducted a non-blinded review of the coded transcripts to verify their accuracy, and discussed coding discrepancies (which were minimal) until they reached consensus. Finally, we used axial coding to develop an integrative understanding of the connections between codes that explained our data and provided a conceptual framework for presenting our results.<sup>15</sup> We also shared results with clinical members of the research team and

sought their feedback to ensure face validity. The study was approved by the [blinded] IRB (Approval #201502838). The funding sources had no role in this study.

## **Results**

### Characteristics of Study Subjects

Our sample of 24 emergency physicians consisted of 5 women and 19 men in full-time practice and covered a wide range of experience levels in both countries. The American physicians averaged 7.8 years' post-residency practice experience in emergency medicine (range: 2 – 17 years). The English physicians averaged 6.9 years of practice experience in emergency medicine at consultant grade (rough equivalent of post-residency practice in the UK) (range: 1 – 15 years). While the use of care pathways was described in the English medical centers, neither the English nor American study sites had explicit inclusion/exclusion criteria for observation services use. In the American study site, the care of observation patients was assumed by hospitalists, while in the English study sites, this care continued to be provided by the emergency physician.

### Main Results

Based on the interview data, we present three overarching themes derived from axial coding as summarized in Figure 1. First, we explore the physician's initial decision to admit, observe, or discharge. In particular, we examine the tradeoffs between the benefits of heuristics in resource-constrained environments and the potential for cognitive biases. Next, we shift specifically to the rationales physicians invoked for observation services use. Participants described a mix of benefits—e.g., additional time to gather clinical data and deliver protocol-driven care—and drawbacks—e.g., use of observation to avoid admission and discharge decisions. Finally, we explore how a physician's decision-making may change once a patient is

placed in observation. While all respondents agreed participants that observation services permitted more time for decision-making, some saw that as an opportunity to think more systematically, while others warned that it could foster cognitive biases.

The initial decision to admit, observe, or discharge patients

When a patient presents at the ED, the physician's primary task is risk stratification, which, according to respondents in both countries, begins with rapidly ruling out life-threatening conditions:

The first thing that we are always thinking is: Do they have one of 10 or 15 diagnoses that is going to kill them right now? (US #1)

*In the ED we're more focused on what's the worst thing it can be, and can I say it's not the worst thing? Or am I still worried about the worst thing? And you might do testing to prove it's not the worst thing.* (US #8)

*In the emergency room you're trying to rule out things that are going to kill people really....I'd work out what I think is the serious diagnosis I definitely don't want to miss and then work out ways of ruling them out...and then do those tests.*

(England #1)

To get a more concrete sense of this initial decision-making process, we asked interviewees to walk us through their approach to handling patients using two common presentations: chest pain and abdominal pain. In both cases, their responses underscored the use of risk-stratification:



Somebody comes in with the complaint of chest pain [my] first question is: Are they having an ST elevation *myocardial infarction*...?...[My second question is:] Are they having one of a number of other potential rapidly fatal causes of chest pain?...[M]y third question is, do they have an alternate diagnosis that I can clearly establish with evidence gathered in the emergency department such as pneumonia, such as spontaneous pneumothorax, such as shingles of the chest? [I]n those patients in whom acute coronary syndrome should be considered as even a potential diagnosis, then I go through one, I go through two, I go through three, and if the answer to questions one, two, and *three are all no, those...patients...* are going into the observation unit. (US #7)

The same sort of process was observed for abdominal pain:

*Once you've got sort of the pain questions out of the way, you'd want to know if there were any associated symptoms, diarrhea, vomiting, PR bleeding, hematemesis, anything like that. In a male, you'd want to know about testicular pain. In a female, you'd want to know about pregnancies, previous pregnancies, gynecological history...* I would then tailor my further questioning, depending on the answers to those sort of base questions. Again, *always thinking that there's going to be something that will catch you out somewhere. And patients—thinking about what's common in certain age groups. Belly pain go through to your back in a 75-year-old, that's a rupture triple A until proven otherwise.* (England #2)

In any event, this initial risk stratification process happens quickly, and respondents indicated their ability to make very rapid decisions:

You can probably pick up within 30 seconds, two minutes, whether you think someone is going to need admission. (England #2)

A skilled emergency physician probably knows whether the patient is going home or being admitted within about two to five minutes of walking into a room, looking at the patient, looking at their vital signs, taking a couple focused questions and examining them... (US #2)

[I]f you've been doing it for a while, you can nine times out of ten look at a patient and the first 15 seconds know *what that patient's ultimate disposition is* going to be. (US #3)

While some referred to these rapid and seemingly intuitive decisions as “gut instinct,” others described patterns arising from learned experience—in accordance with Klein’s recognition-primed decision model.<sup>16</sup> As two respondents put it:

[O]ver time you start to *recognize a pattern*...patients fit into a certain group based on age, medical problems, *chief complaints they have*...[O]nce you determine what *you're going to do with that*...group then decision-making becomes a little bit easier. (US #2)

*As you*...progress in your career, the gut instinct starts coming in a lot *more*...[T]his is what experience is all about that you see a lot more patients and you start developing patterns in your brain *and*...*recognizing them*...earlier. (England #9)

While pattern recognition and “gut instinct” are two ways of describing the same phenomenon, respondents also stressed the importance of the replicability of analytic thinking:

Being [an emergency] *pediatrician for 15 years I'd be foolish to say that gut instinct doesn't come into it....but...I can't be using the process purely on instinct because I can't train that in somebody who's only got six months' experience. It still has to be relatively guideline driven in terms of it doesn't matter who you see, that they're going to make a safe decision....*(England #3)

Similarly, most participants noted the utility of evidence-based protocols in guiding them to an initial diagnosis, while acknowledging the role of clinical judgment. As one participant put it, “*patients are not going to come with guidelines in their presentation*” so “*there is always space for using common sense in between*” (England #4). Often, these decisions to ignore evidence-based guidelines seemed designed to err on the side of caution, and were usually driven by respondents’ own risk aversion and the influence of the ‘horror story’:

You always have that *sort of gut instinct...where you just feel something doesn't sound right or this doesn't look right to me and I'm going to over-investigate you...because....something just says to me don't send this person home. (England #5)*

[I]t just sort of gives you a sense *in the pit of your stomach that this isn't one to take a risk on...We always hear about the patients that you sent home that you shouldn't have. (US #4)*

[Y]ou might think, oh gosh, one of my mates once told me about a 30-year-old with no risk factors who had chest pain reproducible by palpation who died of an MI two weeks later. If you allow that sort of bias to creep in, then you start making daft decisions like ordering troponin tests on 30-year-olds with reproducible chest wall pain who have no risk factors for coronary heart disease. (England #6)

Upon conscious reflection, several participants indicated that a 5–10% risk of an adverse outcome would keep them from discharging a patient, although one respondent admitted that the true threshold is even lower:

You know, *if we are really being honest, it's probably close to two or one [percent]. We all say five so we sound good.* (US #1)

Facilitating or postponing decision-making? The rationale for using observation

Setting aside patients obviously warranting admission or discharge, both English and American physicians reported that observation services are indicated when there is a clear need to gather additional information or when the diagnosis and treatment plan are well-established and time-limited:

[P]utting them in the observation unit would give us time for the disease to present itself, essentially...*[For example]...we know...appendicitis...will get worse over the next 24 hours so in that type of situation, observation is really quite good.* (US #3)

*Observation units for me are about time as a tool....We just sometimes need longer with these patients to see which way their disease is progressing and therefore we're stratifying them rather than just a very definitive very black and*

white decision of admission or home. It gives us a third way and it keeps patients safe. (England #3)

*I think if you can't create a protocol for them...that means there is enough ambiguity and diagnosis questioning that they may not be ideal for obs. (US #5)*

*Those patients that need observation, normally...it's the sort of patient where you need to do an intervention of some description...Once you've done that intervention or two, they're good to go home. (England #2)*

*I'm observing this patient specifically to look for this thing and if I find it, I'll admit them. If I don't, I'll discharge them. (England #6)*

However, many physicians in both England and the U.S. mentioned that observation services were sometimes used to postpone decision-making. If the physician is uncomfortable deciding to admit or discharge, he or she may place patients in observation by default:

*[It's] sometimes cynically called the clinical indecision unit...because it's an easy option for junior doctor. You'd see a tricky patient, you're wondering, they look okay. I think I can send them home, but I've heard these horror stories about people dropping dead two days after they're sent home. I'll do some blood tests. I'll put them on the decision unit. By the time the blood tests come back, I'll have*

finished my shift, or maybe *I'll be feeling more decisive. Something will happen.*

(England #6)

*People who don't want to decide what to do with their patient, just want to hand them on to the next doctor, will put them down there. And sometimes that's a conscious thing, and more often it's probably not a conscious thing....I would assume they're thinking...[t]ime and some investigations may help this. (England #7)*

Thus, observation not only offers an opportunity to gather additional information and improve decision quality, but also represents a means of postponing decision-making, without a clear idea of how observation might improve decisions. Of course, postponing the ultimate decision about the patient's disposition is itself a decision. Thus, the availability of observation services does not necessarily result in further data collection to make decisions.

#### Decision-making in the context of observation

Beyond the decision to observe, it is equally important to understand whether and how physicians' decision-making changes once the contextual environment has been altered by placing the patient in observation. We expected that this would afford physicians additional time, enabling them to shift from intuitive to analytic thinking, but that was not always the case.

The observation unit was clearly considered a more comfortable, less stressful environment compared to the ED, which many saw as an opportunity to approach patients more systematically:

*I'm not so time pressured to make a decision on them yet, so yeah, it probably does slow things down perhaps. (England #1)*

There are patients where you just become a little bit more relaxed and you can *say, actually, I've got a bit more time now, I can have a more of a think around this, we can just see how things go...* (England #5)

I usually spend a lot more time before arriving at the firm conclusion that a *patient can go home...*[M]y decision-making processes or my investigative processes are just as systematic if not more systematic once I am on [the observation unit]. (England #8)

Alternatively, some respondents felt that the additional time afforded by placing a patient in observation could harm decision-making:

Certainly giving yourself more time to think about things is a helpful part of the *process...*[However,] the more time you have to think about a patient, the more you start thinking of those horror stories and the more of these cognitive biases [you] pick up. (England #6)

## Limitations

Our study is subject to some limitations. Foremost among these is the difficulty in assessing physicians' cognitive decision-making processes via a retrospective interview format, which introduces the possibility of recall bias. It is notoriously difficult to explicitly ask questions about an inherently subconscious process like intuitive reasoning. Related to this, participants often offered examples about how others practice, which may be even less accurate than one's own metacognitive processes. While direct observation of physicians in practice, or interviews occurring immediately following decision-making could reduce such bias, doing so is

potentially resource intensive, raises issues of patient confidentiality, and is likewise subject to its own biases (e.g., the Hawthorne effect). Another limitation is that our reliance on physicians at just three hospitals may limit the transferability of our findings to the extent that there is homogeneity of practice within a given setting. However, recent work has documented significant inter-physician practice variation even within a single ED.<sup>17</sup> Still, despite including physicians with a range of practice experience, our convenience sample is admittedly skewed towards younger physicians. To the extent that physician decision-making changes with practice experience, this may introduce maturation effects, and to the extent that the younger physicians trained in an era of clinical guidelines and protocols, whereas more seasoned physicians did not, this may introduce cohort effects. However, both of these biases would be a greater concern in a quantitative study, whereas the goal of our qualitative analysis was to identify concepts and uncover diverse perspectives, which our sample certainly accomplished.

## Discussion

Emergency physician decision-making is an underrepresented area in the study of medical decision-making. In the emergency department (ED), physicians must “assess patients with whom...[they are]...unfamiliar, within narrow time frames, and...with limited resources.”<sup>18</sup> Some feel this increases reliance on intuitive thinking, exacerbates errors, and adversely impacts patient outcomes,<sup>19-22</sup> while others suggest that heuristics (in the form of experience-based pattern-matching) may be used to arrive quickly at a “workable choice” with minimal analytic reasoning.<sup>16,23-26</sup> Proponents of analytic thinking argue that physicians should minimize intuitive thinking in favor of protocol-driven care,<sup>27-31</sup> while proponents of intuitive thinking argue that inadequate medical knowledge—not use of heuristics—causes diagnostic error<sup>32-34</sup> and they encourage the development and use of “fast-and-frugal” decision trees.<sup>34,35</sup> However, still others



have questioned the very notion of distinct intuitive and analytic thought processes, instead proposing a single, highly adaptive, closed-loop abductive muddling thought process of expert decision-making.<sup>36</sup>

To our knowledge, no prior work has examined this decision-making in the context of rapidly growing observation services use. Prior to the advent of observation services, physicians faced a binary choice to admit or discharge patients. Now, there are three options. As we have previously discussed, both policy and patient socioeconomic factors can influence emergency physicians' decisions to use observation services.<sup>14</sup> Here, however, we focus exclusively on the cognitive aspects of clinical decision-making and observation services use in the ED. Our findings provide a better understanding of how the introduction of observation services has influenced physicians' decision-making, how physicians' decision-making has influenced use of observation services, and how intuitive and analytic thinking influence both of these processes.

The initial decision to admit, observe, or discharge a patient was overwhelmingly described as a process of risk stratifying patients. In contrast to our and others' expectations,<sup>37-39</sup> we did not find a linear, stepwise progression from a rapid intuitive differential diagnosis to a more considered analytic reappraisal, but rather a varying reliance on both modes.<sup>40</sup> While emergency physicians express a preference for analytic reasoning in the abstract,<sup>41</sup> our findings suggest a more pragmatic, mixed cognitive approach occurs within the resource-constrained environment of the ED.

Physicians essentially described using heuristics to make safe and timely decisions. Foremost among these were the "common thing" and "worst case" heuristics—the first representing a confirmatory search for the most likely explanation given a patient's symptoms and the second representing a ruling out search for the least likely, but most potentially harmful,

explanation for those same symptoms.<sup>11</sup> By asking tailored questions and ordering certain tests, the emergency physician delineates diagnostic boundaries, quickly generates differential diagnoses, and determines whether to admit, observe, or discharge the patient.

Consistent with prior research, our respondents indicated that this process happens very quickly—often in as little as 15 seconds to 5 minutes.<sup>9,42</sup> Such rapid, heuristic-based decisions suggest intuitive thinking, but experienced individuals can make rapid decisions using analytic thinking, by quickly working through the steps of a care protocol. Flach and colleagues argue that this is a single cognitive muddling process that simply feels more or less intuitive depending on the ease of pattern recognition.<sup>36</sup>

In the resource-constrained environment of the ED, physicians are going to—at least occasionally—make mistakes. If they err on the side of caution, the result is a false alarm. If they err in the other direction, they risk missing a serious condition. Using heuristics is an efficient way for emergency physicians to make decisions, but it is not without its limits. While most respondents indicated that observation services exist to provide time-limited treatment prior to discharge, or specific further testing prior to making the admission or discharge decision, respondents in both countries also acknowledged the use of observation services to mitigate fears of missing something important—even if such an outcome is highly improbable. Similar to recent work on emergency physician risk estimates and admission decisions, our respondents indicated that a 1% risk of an adverse outcome was sufficient to prevent them from discharging a patient [cite Schriger et al. 2018]. While this is unlikely to result in worse clinical outcomes, it may lead to inefficient use of health care resources, inconvenience for patients, ED crowding, and lower quality of care. Fortunately, respondents suggested that this tendency towards overreliance on observation services as a “safety net” diminishes with practice experience.

Presumably, this is because physician pattern recognition improves and risk tolerance increases. It is also important to note that emergency physicians do not make decisions in isolation. EDs function as a team, the checks and balances of which can combat the limitations of heuristics.<sup>36</sup> Thus, more senior physicians may prevent their less experienced colleagues from using observation services less judiciously.

Respondents suggested that their subsequent decision-making could be differentially influenced by placing patients in observation. While all respondents suggested that observation services are delivered in a more relaxed environment versus the ED, there was disagreement about whether the additional time was helpful or harmful to decision-making. Some respondents indicated that observation provides a greater opportunity for analytic thinking. This might occur through an iterative process. For example, a patient is placed in observation, receives a test, the physician sees the test result, reevaluates the patient and proceeds to discharge, admit, or order further indicated testing. However, other respondents argued that having extra time could backfire, allowing physicians to succumb further to the very thought processes responsible for the patient's initial placement in observation.

Overall, our findings suggest that emergency physicians use heuristics to make safe and timely decisions about admitting or discharging patients. Observation services are a tool that can facilitate or impede that process depending on the physician's individual level of risk aversion, and the policy incentives and clinical norms inherent to the health care system in which they practice. Less experienced or otherwise more risk-averse physicians may be inclined to use observation to postpone the ultimate decision of admission or discharge, and while the additional time observation affords is often beneficial to decision-making, it can also lead to unnecessary testing and extended stays in the hospital.

Accordingly, we suggest two sets of interventions that might facilitate optimal evidence-based observation services use.<sup>2,43-48</sup> First, it seems sensible to establish clear criteria for placement in observation that focus on using observation to facilitate the admission-versus-discharge decision, rather than avoiding decisions under the guise of watchful waiting (recognizing that for some conditions like head injury, watchful waiting is itself an appropriate protocol). Simultaneously, once a patient is placed under observation, they must be approached with defined endpoints in mind, lest the extra time merely result in over-investigation and delayed admission or discharge.

Second, we endorse the calls of others for more explicit consideration of the role of intuitive and analytic thinking.<sup>20,37</sup> Physicians need to understand the strengths and weaknesses of both approaches, and deliberately engage in metacognitive reflection on their practice patterns. Croskerry (2014) suggests numerous interventions to improve the quality of intuitive thinking and prompt appropriate resort to analytic thinking. Given that every decision to admit, observe or discharge is ultimately a matter of physician judgement rather than presence or absence of options and protocols, such interventions would appear vital if the appropriate, delicate balance between patient safety, optimal outcome, and system efficiency is to be achieved.

## References

1. Feng Z, Wright B, Mor V. Sharp Rise In Medicare Enrollees Being Held In Hospitals For Observation Raises Concerns About Causes And Consequences. *Health Affairs* 2012;31:1251-9.
2. Baugh CW, Venkatesh AK, Bohan JS. Emergency department observation units: A clinical and financial benefit for hospitals. *Health Care ManageRev* 2011;36:28.
3. McGowan A, Hassan TB. Clinical decision units: A new development for emergency medicine in the United Kingdom. *Emergency medicine (Fremantle, WA)* 2003;15:18-21.
4. Wright B, O'Shea AM, Ayyagari P, Ugwi PG, Kaboli P, Sarrazin MV. Observation Rates At Veterans' Hospitals More Than Doubled During 2005–13, Similar To Medicare Trends. *Health Affairs* 2015;34:1730-7.
5. Sheehy AM, Graf B, Gangireddy S, et al. Hospitalized but not admitted: characteristics of patients with "observation status" at an academic medical center. *JAMA internal medicine* 2013;173:1991-8.
6. Cabrera D, Thomas JF, Wiswell JL, et al. Accuracy of 'My Gut Feeling:' Comparing System 1 to System 2 Decision-Making for Acuity Prediction, Disposition and Diagnosis in an Academic Emergency Department. *Western Journal of Emergency Medicine* 2015;16:653.
7. Monteiro SD, Sherbino JD, Ilgen JS, et al. Disrupting diagnostic reasoning: do interruptions, instructions, and experience affect the diagnostic accuracy and response time of residents and emergency physicians? *Academic Medicine* 2015;90:511-7.
8. Beglinger B, Rohacek M, Ackermann S, et al. Physician's First Clinical Impression of Emergency Department Patients With Nonspecific Complaints Is Associated With Morbidity and Mortality. *Medicine* 2015;94:e374.
9. Pelaccia T, Tardif J, Tribby E, et al. Insights into emergency physicians' minds in the seconds before and into a patient encounter. *Internal and emergency medicine* 2015;10:865-73.
10. Blumenthal-Barby J, Krieger H. Cognitive Biases and Heuristics in Medical Decision Making A Critical Review Using a Systematic Search Strategy. *Medical Decision Making* 2014:0272989X14547740.
11. Feufel MA. Bounded rationality in the emergency department: Wright State University; 2009.
12. Mason S, Weber EJ, Coster J, Freeman J, Locker T. Time patients spend in the emergency department: England's 4-hour rule—a case of hitting the target but missing the point? *AnnEmergMed* 2012;59:341-9.
13. Huffman A. Use of Observation Units Growing. *AnnEmergMed*;61:A21-A3.
14. Martin GP, Wright B, Ahmed A, Banerjee J, Mason S, Roland D. Use or Abuse? A Qualitative Study of Emergency Physicians' Views on Use of Observation Stays at Three Hospitals in the United States and England. *AnnEmergMed* 2017;69:284-92. e2.
15. Corbin JM, Strauss AL. Basics of qualitative research: Techniques and procedures for developing grounded theory: Sage Publications Inc; 2008.
16. Klein GA, Calderwood R, Clinton-Cirocco A. Rapid decision making on the fire ground. *Proceedings of the Human Factors and Ergonomics Society annual meeting*; 1986: SAGE Publications. p. 576-80.
17. Smulowitz PB, Barrett O, Hall MM, Grossman SA, Ullman EA, Novack V. Physician Variability in Management of Emergency Department Patients with Chest Pain. *Western Journal of Emergency Medicine* 2017;18:592.
18. Croskerry P. The cognitive imperative thinking about how we think. *AcadEmergMed* 2000;7:1223-31.
19. Croskerry P, Sinclair D. Emergency medicine: A practice prone to error? *Cjem* 2001;3:271-6.
20. Croskerry P. ED cognition: any decision by anyone at any time. *CJEM* 2014;16:13-9.

21. Guttman A, Schull MJ, Vermeulen MJ, Stukel TA. Association between waiting times and short term mortality and hospital admission after departure from emergency department: population based cohort study from Ontario, Canada. *Bmj* 2011;342:d2983.
22. Croskerry P. A universal model of diagnostic reasoning. *Academic Medicine* 2009;84:1022-8.
23. Klein G. Developing expertise in decision making. *Thinking & Reasoning* 1997;3:337-52.
24. Klein G. Naturalistic decision making. *Human factors* 2008;50:456-60.
25. Pelaccia T, Tardif J, Tribby E, et al. How and when do expert emergency physicians generate and evaluate diagnostic hypotheses? A qualitative study using head-mounted video cued-recall interviews. *AnnEmergMed* 2014;64:575-85.
26. Pelaccia T, Tardif J, Tribby E, et al. From Context Comes Expertise: How Do Expert Emergency Physicians Use Their Know-Who to Make Decisions? *AnnEmergMed* 2016;67:747-51.
27. Fargen KM, Friedman WA. The science of medical decision making: neurosurgery, errors, and personal cognitive strategies for improving quality of care. *World neurosurgery* 2014;82:e21-e9.
28. Tversky A, Kahneman D. Judgment under uncertainty: Heuristics and biases. *Science* 1974;185:1124-31.
29. Kahneman D, Tversky A. Prospect theory: An analysis of decision under risk. *Econometrica: Journal of the Econometric Society* 1979:263-91.
30. Kahneman D, Tversky A. *Choices, values, and frames*: Cambridge University Press; 2000.
31. Kahneman D. *Thinking, fast and slow*: Macmillan; 2011.
32. McLaughlin K, Eva KW, Norman GR. Reexamining our bias against heuristics. *Advances in Health Sciences Education* 2014;19:457-64.
33. Gigerenzer G. Why heuristics work. *Perspectives on psychological science* 2008;3:20-9.
34. Gigerenzer G, Gaissmaier W. Heuristic decision making. *Annual review of psychology* 2011;62:451-82.
35. Bodemer N, Hanoch Y, Katsikopoulos KV. Heuristics: foundations for a novel approach to medical decision making. *Internal and emergency medicine* 2015;10:195-203.
36. Flach JM, Feufel MA, Reynolds PL, Parker SH, Kellogg KM. Decisionmaking in practice: The dynamics of muddling through. *Applied Ergonomics* 2017;63:133-41.
37. Balla JI, Heneghan C, Glasziou P, Thompson M, Balla ME. A model for reflection for good clinical practice. *Journal of evaluation in clinical practice* 2009;15:964-9.
38. Norman G, Young M, Brooks L. Non-analytical models of clinical reasoning: the role of experience. *Medical education* 2007;41:1140-5.
39. Mamede S, Schmidt HG, Rikers RM, Penaforte JC, Coelho-Filho JM. Breaking down automaticity: case ambiguity and the shift to reflective approaches in clinical reasoning. *Medical education* 2007;41:1185-92.
40. Croskerry P. Clinical cognition and diagnostic error: applications of a dual process model of reasoning. *Advances in health sciences education* 2009;14:27-35.
41. Calder LA, Forster AJ, Stiell IG, et al. Experiential and rational decision making: a survey to determine how emergency physicians make clinical decisions. *Emergency Medicine Journal* 2011:emermed-2011-200468.
42. Balla J, Heneghan C, Thompson M, Balla M. Clinical decision making in a high-risk primary care environment: a qualitative study in the UK. *BMJ open* 2012;2:e000414.
43. Ross MA, Hockenberry JM, Mutter R, Barrett M, Wheatley M, Pitts SR. Protocol-driven emergency department observation units offer savings, shorter stays, and reduced admissions. *Health Affairs* 2013;32:2149-56.
44. MacLaren RE, Ghoorahoo HI, Kirby NG. Use of an accident and emergency department observation ward in the management of head injury. *The British journal of surgery* 1993;80:215-7.

45. Rydman RJ, Isola ML, Roberts RR, et al. Emergency department observation unit versus hospital inpatient care for a chronic asthmatic population: a randomized trial of health status outcome and cost. *Medical care* 1998;36:599.
46. Goodacre SW. Should we establish chest pain observation units in the UK? A systematic review and critical appraisal of the literature. *Journal of accident & emergency medicine* 2000;17:1-6.
47. Fermann GJ, Collins SP. Observation units in the management of acute heart failure syndromes. *Current heart failure reports* 2010;7:125.
48. Fermann GJ, Collins SP. Observation Unit Admission Inclusion and Exclusion Criteria. *Short Stay Management of Acute Heart Failure* 2012:165.